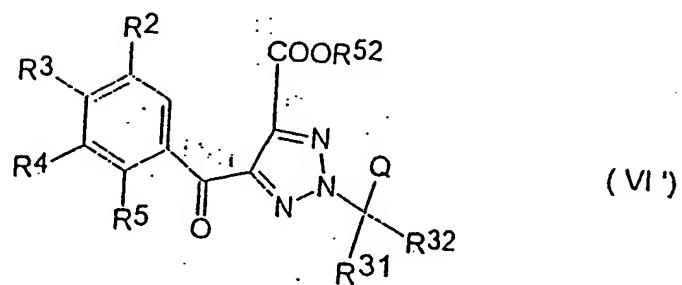


Amendments to the Claims

1-18. (Cancelled)

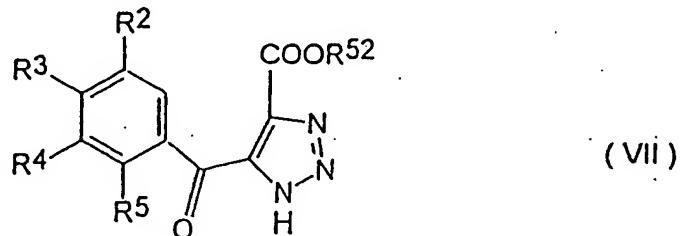
19-21. (Cancel)

22. (Withdrawn) A process for producing a compound represented by formula (VI')



wherein Q represents the group (i) as defined in claim 1, R<sup>2</sup> to R<sup>5</sup>, R<sup>31</sup>, R<sup>32</sup>, and R<sup>52</sup> are as defined above, which comprises the steps of:

(1) reacting a compound represented by formula (VII)



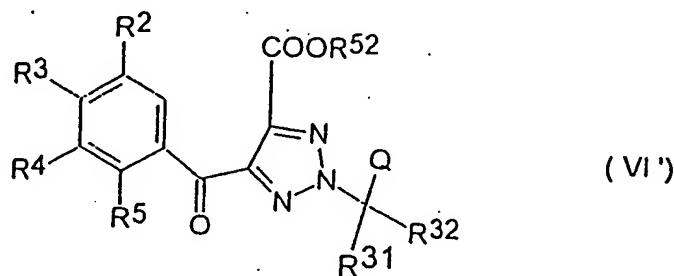
wherein R<sup>2</sup> to R<sup>5</sup> and R<sup>52</sup> are as defined above, with a compound represented by R<sup>31</sup>R<sup>32</sup>C=O wherein R<sup>31</sup> and R<sup>32</sup> are as defined in claim 1;

(2) reacting the compound prepared in step (1) with a compound represented by R<sup>71</sup>-C(=O)-

R<sup>72</sup> wherein R<sup>71</sup> and R<sup>72</sup> each independently represent a chlorine atom, 4-nitrophenyl, or 1-imidazolyl; and

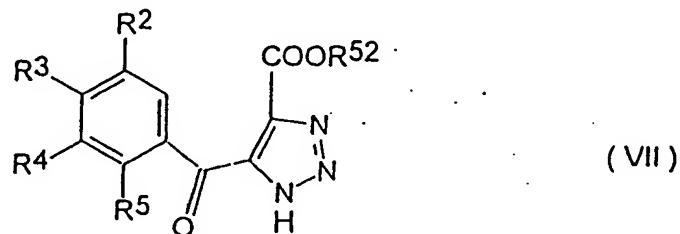
(3) reacting the compound prepared in step (2) with a compound represented by R<sup>33</sup>OH wherein R<sup>33</sup> is as defined in claim 1.

23. (Withdrawn) A process for preparing a compound represented by formula (VI')



wherein Q represents group (i) as defined in claim 1, R<sup>2</sup> to R<sup>5</sup>, R<sup>31</sup>, R<sup>32</sup>, and R<sup>52</sup> are as defined above, which comprises the steps of:

(1) reacting a compound represented by formula (VII)

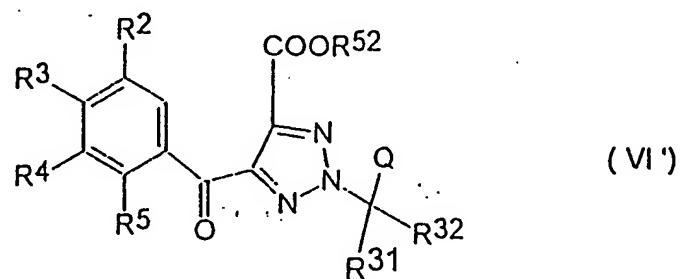


wherein R<sup>2</sup> to R<sup>5</sup> and R<sup>52</sup> are as defined above, with a compound represented by R<sup>31</sup>R<sup>32</sup>C=O wherein R<sup>31</sup> and R<sup>32</sup> are as defined in claim 1; and

(2) reacting the compound prepared in step (1) with a compound represented by HalCOOR<sup>33</sup>

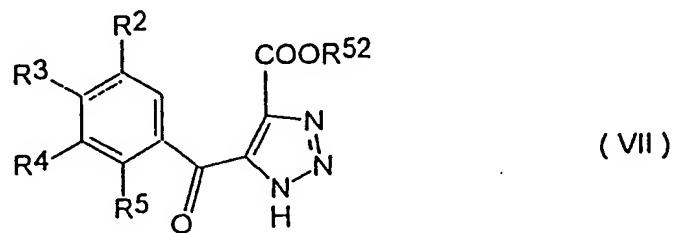
wherein Hal represents a halogen atom and R<sup>33</sup> is as defined in claim 1, in the presence of an alkali metal carbonate and an alkali metal iodide.

24. (Withdrawn) A process for producing a compound represented by formula (VI')



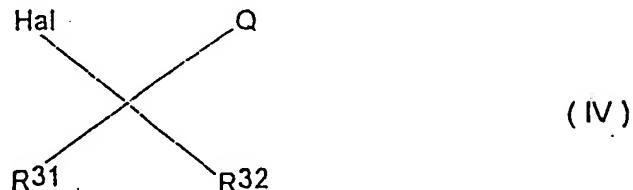
wherein Q represents group (i) as defined in claim 1, R<sup>2</sup> to R<sup>5</sup>, R<sup>31</sup>, R<sup>32</sup>, and R<sup>52</sup> are as defined above, which comprises the step of

reacting a compound represented by formula (VII)



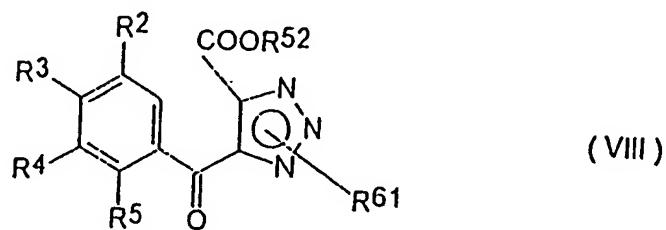
wherein R<sup>2</sup> to R<sup>5</sup> and R<sup>52</sup> are as defined above,

with a compound represented by formula (IV)



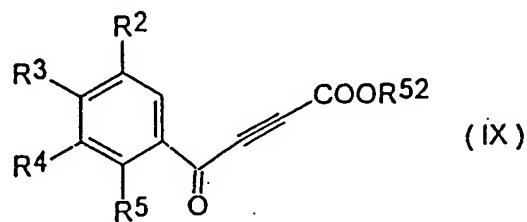
wherein Hal represents a halogen atom, Q represents the group (i) as defined in claim 1, and R<sup>31</sup> and R<sup>32</sup> are as defined above, in the presence of an inorganic base and an alkali metal iodide.

25. (Withdrawn) A process for preparing a compound represented by formula (VIII)



wherein R<sup>2</sup> to R<sup>5</sup>, R<sup>52</sup>, and R<sup>61</sup> are as defined above, which comprises the step of

(a) reacting a compound represented by formula (IX)



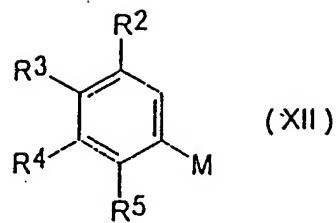
wherein R<sup>2</sup> to R<sup>5</sup> and R<sup>52</sup> are as defined above,

with a compound represented by formula (X)



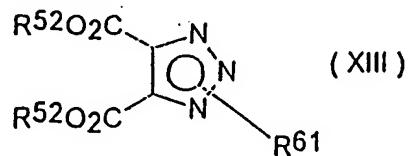
wherein R<sup>61</sup> is as defined above, or

(b) reacting a compound represented by formula (XII)



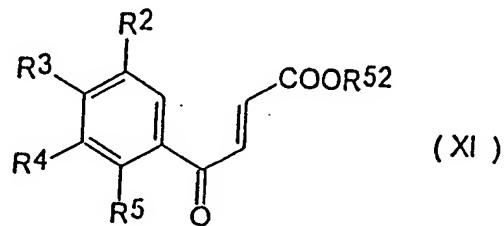
wherein M represents lithium, magnesium chloride, magnesium bromide, magnesium iodide, zinc bromide, zinc iodide, cadmium bromide, iodide cadmium, or copper and R<sup>2</sup> to R<sup>5</sup> are as defined in claim 1,

with a compound represented by formula (XIII)



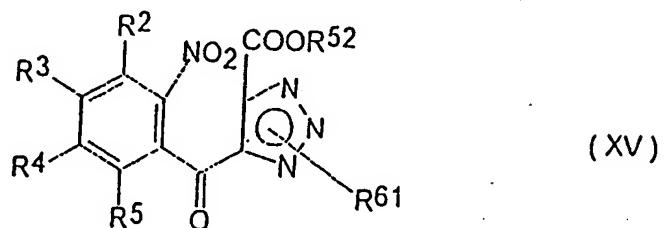
wherein R<sup>52</sup> and R<sup>61</sup> are as defined above.

26. (Withdrawn) A process according to claim 25, which further comprises the step of, prior to the reaction of the compound represented by formula (IX) with the compound represented by formula (X) in step (a), dehydrogenating a compound represented by formula (XI)

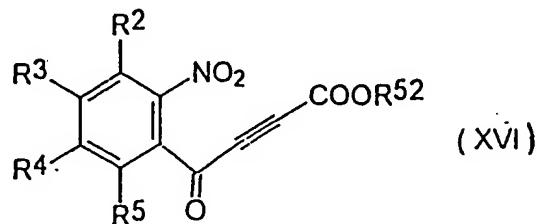


wherein  $R^2$  to  $R^5$  and  $R^{52}$  are as defined above,  
to produce the compound represented by formula (IX).

27. (Withdrawn) A process for producing a compound represented by formula (XV)



wherein  $R^2$  to  $R^5$ ,  $R^{52}$ , and  $R^{61}$  are as defined above, which comprises the step of reacting a compound represented by formula (XVI)

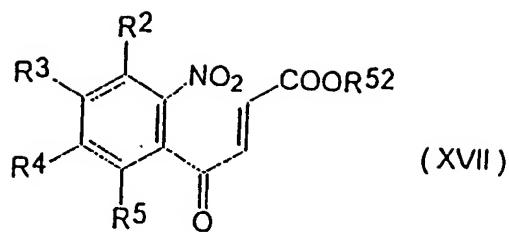


wherein  $R^2$  to  $R^5$ , and  $R^{52}$  are as defined above,  
 with a compound represented by formula (X)



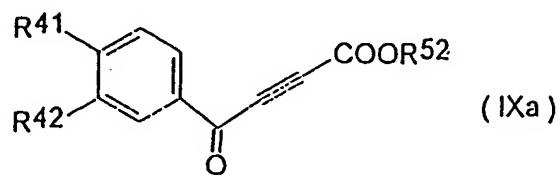
wherein  $R^{61}$  is as defined in claim 18.

28. (Withdrawn) A process according to claim 27, which further comprises the step of, prior to the reaction of the compound represented by formula (XVI) with the compound represented by formula (X), a compound represented by formula (XVII)



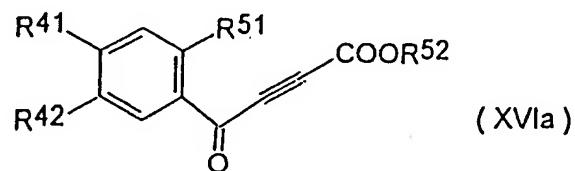
wherein R<sup>2</sup> to R<sup>5</sup> and R<sup>52</sup> are as defined above,  
is dehydrogenated to produce the compound represented by formula (XVI).

29. (Withdrawn) A compound represented by formula (IXa) or a salt or solvate thereof



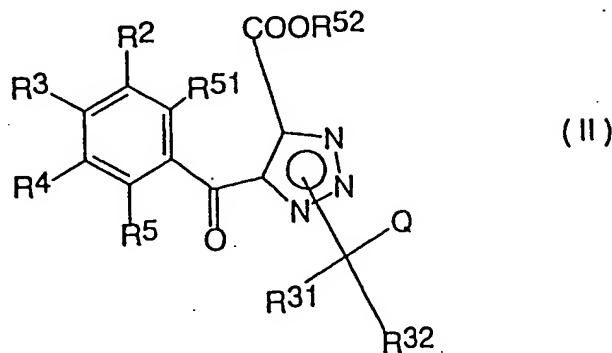
wherein R<sup>41</sup>, R<sup>42</sup>, and R<sup>52</sup> are as defined in claim 6, provided that R<sup>41</sup> and/or R<sup>42</sup> do not represent a hydrogen atom.

30. (Withdrawn) A compound represented by formula (XVIa) or a salt or solvate thereof



wherein  $R^{41}$ ,  $R^{42}$ ,  $R^{51}$ , and  $R^{52}$  are as defined in claim 6.

31. (Currently amended) A compound represented by formula (II) or a salt or solvate thereof:



wherein  $R^2$ ,  $R^3$ ,  $R^4$ , and  $R^5$ , which may be the same or different, represent any of the following (a) to (n):

- (a) a hydrogen atom;
- (b) a halogen atom;
- (c) an optionally protected hydroxyl group a hydroxyl group optionally protected by acetyl, chloroacetyl, dichloroacetyl, trichloroacetyl, benzoyl, 4-nitrobenzoyl, 3-oxobutyryl, benzyl, diphenylmethyl, triphenylmethyl, 4-methoxybenzyl, 3,4-dimethoxybenzyl, methoxymethyl, methoxyethoxymethyl, benzyloxymethyl, trimethylsilyl, tert-butyldimethylsilyl, triphenylsilyl, 2-tetrahydropyranyl, or trimethylsilylethoxymethoxy,
- (d) formyl;
- (e)  $C_{1-12}$  alkyl which may be substituted by a halogen atom;

(f)  $C_{2-12}$  alkenyl which has one or more carbon-carbon double bonds and may be substituted by

- (1) a halogen atom,
- (2) cyano,
- (3)  $-COR'$  wherein  $R'$  represents a hydrogen atom or  $C_{1-6}$  alkyl,
- (4)  $-COOR^{10}$  wherein  $R^{10}$  represents a hydrogen atom or  $C_{1-6}$  alkyl,
- (5)  $-CONR^{11}R^{12}$  wherein  $R^{11}$  and  $R^{12}$ , which may be the same or different, represent
  - (i) a hydrogen atom,
  - (ii)  $C_{1-6}$  alkyl which may be substituted by amino optionally substituted by  $C_{1-4}$  alkyl, phenyl optionally substituted by  $C_{1-4}$  alkyl which may be substituted by a saturated five- to seven-membered heterocyclic ring containing one or two nitrogen atoms (the nitrogen atoms may be substituted by  $C_{1-4}$  alkyl), or a saturated or unsaturated five- to seven-membered heterocyclic ring,
  - (iii) phenyl which may be substituted by carboxyl, or
  - (iv) a saturated or unsaturated five to seven-membered heterocyclic ring,
- (6) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by  $C_{1-4}$  alkyl or may form a bicyclic ring fused with another ring;
- (g)  $C_{1-12}$  alkoxy which may be substituted by
  - (1) a halogen atom,
  - (2) a hydroxyl group,
  - (3) cyano.,

- (4) C<sub>1-4</sub>, cycloalkyl,
- (5) phenyl,
- (6) C<sub>1-4</sub> alkoxy,
- (7) phenoxy,
- (8) amino which may be substituted by C<sub>1-4</sub> alkyl;
- (9) -COR<sup>11</sup> wherein R<sup>11</sup> represents a hydrogen atom, C<sub>1-6</sub> alkyl, phenyl optionally substituted by halogen or C<sub>1-4</sub> alkoxy, or phenyl C<sub>1-4</sub> alkyl,
- (10) -COOR<sup>14</sup> wherein R<sup>14</sup> represents a hydrogen atom or C<sub>1-6</sub> alkyl,
- (11) -CONR<sup>15</sup>R<sup>16</sup> wherein R<sup>15</sup> and R<sup>16</sup>, which may be the same or different, represent a hydrogen atom or C<sub>1-6</sub> alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or
- (12) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by C<sub>1-4</sub> alkyl or phenyl C<sub>1-4</sub> alkyl;

(h) -C=N-OR<sup>16a</sup> wherein R<sup>16a</sup> represents a hydrogen atom, C<sub>1-6</sub> alkyl, phenyl C<sub>1-4</sub> alkyl, or phenyl;

(i) -(CH<sub>2</sub>)<sub>m</sub>OR<sup>17</sup> -(CH<sub>2</sub>)<sub>m</sub>OR<sup>17</sup> wherein m is an integer of 0 to 4, and R<sup>17</sup> represents a hydrogen atom, C<sub>1-6</sub> alkyl, or phenyl C<sub>1-4</sub> alkyl of which one or more hydrogen atoms on the benzene ring may be substituted by C<sub>1-4</sub> alkyl;

(j) -(CH<sub>2</sub>)<sub>k</sub>COR<sup>18</sup> -(CH<sub>2</sub>)<sub>k</sub>COR<sup>18</sup> wherein k is an integer of 1 to 4, and R<sup>18</sup> represents a hydrogen atom or C<sub>1-4</sub> alkyl;

(k) -(CH<sub>2</sub>)<sub>j</sub>COOR<sup>19</sup> -(CH<sub>2</sub>)<sub>j</sub>COOR<sup>19</sup> wherein j is an integer of 0 to 4, and R<sup>19</sup> represents a hydrogen atom or C<sub>1-6</sub> alkyl;

(l) -(CH<sub>2</sub>)<sub>p</sub>NR<sup>20</sup>R<sup>21</sup> -(CH<sub>2</sub>)<sub>p</sub>NR<sup>20</sup>R<sup>21</sup> wherein p is an integer of 1 to 4, and R<sup>20</sup> and R<sup>21</sup>, which may be the same or different, represent

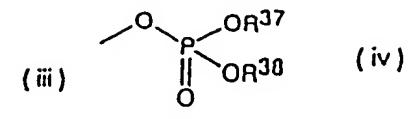
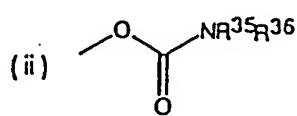
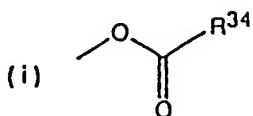
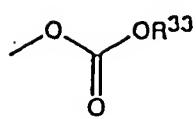
- (1) a hydrogen atom,
- (2)  $C_{1-6}$  alkyl which may be substituted by amino optionally substituted by  $C_{1-4}$  alkyl,
- (3) phenyl  $C_{1-4}$  alkyl,
- (4)  $-COR^{22}$  wherein  $R^{22}$  represents a hydrogen atom or  $C_{1-4}$  alkyl which may be substituted by carboxyl, or
- (5)  $-SO_2R^{23}$  wherein  $R^{23}$  represents  $C_{1-4}$  alkyl or phenyl which may be substituted by a halogen atom;

(m)  $-(CH_2)_q-CONR^{24}R^{25}-$   $(CH_2)_q-CONR^{24}R^{25}$  wherein q is an integer of 0 to 4, and  $R^{24}$  and  $R^{25}$ , which may be the same or different, represent a hydrogen atom, a saturated or unsaturated five- to seven-membered heterocyclic ring, or  $C_{1-6}$  alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or alternatively  $R^{24}$  and  $R^{25}$  may form a saturated or unsaturated five- to seven-membered heterocyclic ring together with a nitrogen atom to which they are attached (the heterocyclic ring may further contain at least one oxygen, nitrogen, or sulfur atom, may form a bicyclic ring fused with another ring, or may be substituted by  $C_{1-4}$  alkyl); and

(n)  $-NR^{26}R^{27}$  wherein  $R^{26}$  and  $R^{27}$ , which may be the same or different, represent a hydrogen atom or  $-COR^{28}$  wherein  $R^{28}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, or phenyl which may be substituted by  $C_{1-4}$  alkyl or  $C_{1-6}$  alkoxy optionally substituted by phenyl;

$R^{21}$  and  $R^{22}$ , which may be the same or different, represent a hydrogen atom or  $C_{1-6}$  alkyl which may be substituted by a halogen atom; and

Q represents a group selected from the following groups (i) to (iv) or a halogen atom or C<sub>1-6</sub> alkoxy:



wherein

R<sup>33</sup> represents

C<sub>1-6</sub> alkyl which may be substituted by C<sub>1-6</sub> alkoxy optionally substituted by C<sub>1-6</sub> alkoxy, phenyl optionally substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or a saturated or unsaturated five- to seven-membered heterocyclic ring optionally substituted by C<sub>1-6</sub> alkoxy, amino, or nitro,

phenyl which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or

a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or

R<sup>33</sup> may form C<sub>1-4</sub> alkylene together with R<sup>31</sup> or R<sup>32</sup>,

R<sup>34</sup> represents

C<sub>1-16</sub> alkyl which may be substituted by a halogen atom, carboxyl, phenyl optionally substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or a saturated or unsaturated five- to seven-membered heterocyclic ring optionally substituted by C<sub>1-6</sub> alkoxy, amino, or nitro,

phenyl which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or

a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro,

R<sup>35</sup> and R<sup>36</sup>, which may be the same or different, represent a hydrogen atom or C<sub>1-6</sub> alkyl which may be

substituted by amino optionally substituted by C<sub>1-6</sub> alkyl or

R<sup>15</sup> and R<sup>16</sup> may form a saturated or unsaturated five- to seven-membered heterocyclic ring together with a nitrogen atom to which they are attached, and

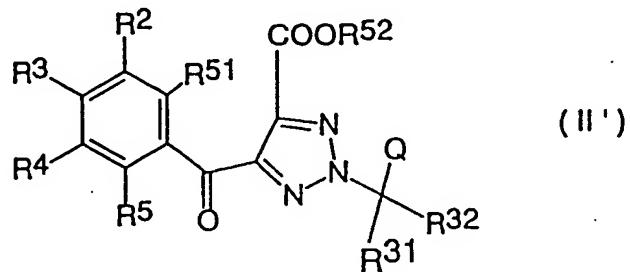
R<sup>17</sup> and R<sup>18</sup>, which may be the same or different, represent C<sub>1-6</sub> alkyl,

R<sup>51</sup> represents nitro or amino, and

R<sup>52</sup> represents a hydrogen atom or a protective group for carboxyl selected from the group consisting of methyl, ethyl, tert-butyl, benzyl, 4-methoxybenzyl, diphenylmethyl, 4-nitrobenzyl, tert-butyldimethylsilyl, triphenylsilyl, 2-phenylsulfonylethyl, 2-methoxycarbonylethyl, 2-cyanoethyl, and 2-trimethylsilylethyl,

provided that the group -CR<sup>31</sup>R<sup>32</sup>Q does not represent C<sub>1-6</sub> alkyl substituted by a halogen atom or C<sub>1-6</sub> alkoxy.

32. (Currently amended) A compound represented by formula (II') or a salt or solvate thereof:



wherein R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, and R<sup>5</sup>, which may be the same or different, represent any of the following (a) to (n):

- (a) a hydrogen atom;
- (b) a halogen atom;
- (c) an optionally protected hydroxyl group a hydroxyl group optionally protected by acetyl, chloroacetyl, dichloroacetyl, trichloroacetyl, benzoyl, 4-nitrobenzoyl, 3-oxobutyryl, benzyl, diphenylmethyl, triphenylmethyl, 4-methoxybenzyl, 3,4-dimethoxybenzyl, methoxymethyl, methoxyethoxymethyl, benzyloxymethyl, trimethylsilyl, tert-butyldimethylsilyl, triphenylsilyl, 2-tetrahydropyranyl, or trimethylsilylethoxymethoxy;
- (d) formyl;
- (e) C<sub>1-12</sub> alkyl which may be substituted by a halogen atom;

(f)  $C_{2-12}$  alkenyl which has one or more carbon-carbon double bonds and may be substituted by

- (1) a halogen atom,
- (2) cyano,
- (3)  $-COR'$  wherein  $R'$  represents a hydrogen atom or  $C_{1-6}$  alkyl,
- (4)  $-COOR^{10}$  wherein  $R^{10}$  represents a hydrogen atom or  $C_{1-6}$  alkyl,
- (5)  $-CONR^{11}R^{12}$  wherein  $R^{11}$  and  $R^{12}$ , which may be the same or different, represent
  - (i) a hydrogen atom,
  - (ii)  $C_{1-6}$  alkyl which may be substituted by amino optionally substituted by  $C_{1-4}$  alkyl, phenyl optionally substituted by  $C_{1-4}$  alkyl which may be substituted by a saturated five- to seven-membered heterocyclic ring containing one or two nitrogen atoms (the nitrogen atoms may be substituted by  $C_{1-4}$  alkyl), or a saturated or unsaturated five- to seven-membered heterocyclic ring,
  - (iii) phenyl which may be substituted by carboxyl, or
  - (iv) a saturated or unsaturated five to seven-membered heterocyclic ring,
- (6) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by  $C_{1-4}$  alkyl or may form a bicyclic ring fused with another ring;

(g)  $C_{1-12}$  alkoxy which may be substituted by

- (1) a halogen atom,
- (2) a hydroxyl group,
- (3) cyano,

- (4)  $C_{1-7}$  cycloalkyl,
- (5) phenyl,
- (6)  $C_{1-4}$  alkoxy,
- (7) phenoxy,
- (8) amino which may be substituted by  $C_{1-4}$  alkyl,
- (9)  $-COR^{11}$  wherein  $R^{11}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, phenyl optionally substituted by halogen or  $C_{1-4}$  alkoxy, or phenyl  $C_{1-4}$  alkyl,
- (10)  $-COOR^{14}$  wherein  $R^{14}$  represents a hydrogen atom or  $C_{1-6}$  alkyl,
- (11)  $-CONR^{15}R^{16}$  wherein  $R^{15}$  and  $R^{16}$ , which may be the same or different, represent a hydrogen atom or  $C_{1-6}$  alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or
- (12) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by  $C_{1-4}$  alkyl or phenyl  $C_{1-4}$  alkyl;

(h)  $-C=N-OR^{16a}$  wherein  $R^{16a}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, phenyl  $C_{1-4}$  alkyl, or phenyl;

(i)  $-(CH_2)_mOR^{17}-(CH_2)_mOR^{17}$  wherein  $m$  is an integer of 0 to 4, and  $R^{17}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, or phenyl  $C_{1-4}$  alkyl of which one or more hydrogen atoms on the benzene ring may be substituted by  $C_{1-4}$  alkyl;

(j)  $-(CH_2)_kCOR^{18}-(CH_2)_kCOR^{18}$  wherein  $k$  is an integer of 1 to 4, and  $R^{18}$  represents a hydrogen atom or  $C_{1-4}$  alkyl;

(k)  $-(CH_2)_jCOOR^{19}-(CH_2)_jCOOR^{19}$  wherein  $j$  is an integer of 0 to 4, and  $R^{19}$  represents a hydrogen atom or  $C_{1-6}$  alkyl;

(l)  $-(CH_2)_pNR^{20}R^{21}-(CH_2)_p-NR^{20}R^{21}$  wherein  $p$  is an integer of 1 to 4, and  $R^{20}$  and  $R^{21}$ , which may be the same or different, represent

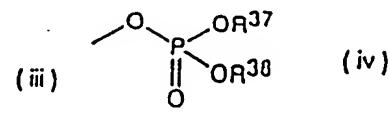
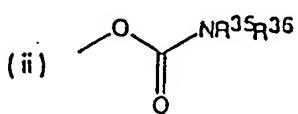
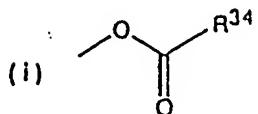
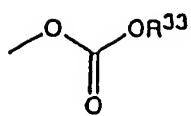
- (1) a hydrogen atom,
- (2)  $C_{1-6}$  alkyl which may be substituted by amino optionally substituted by  $C_{1-6}$  alkyl,
- (3) phenyl  $C_{1-6}$  alkyl,
- (4)  $-COR^{22}$  wherein  $R^{22}$  represents a hydrogen atom or  $C_{1-6}$  alkyl which may be substituted by carboxyl, or
- (5)  $-SO_2R^{23}$  wherein  $R^{23}$  represents  $C_{1-6}$  alkyl or phenyl which may be substituted by a halogen atom;

(m)  $-(CH_2)_q-CONR^{24}R^{25}$   $-(CH_2)_q-CONR^{24}R^{25}$  wherein q is an integer of 0 to 4, and  $R^{24}$  and  $R^{25}$ , which may be the same or different, represent a hydrogen atom, a saturated or unsaturated five- to seven-membered heterocyclic ring, or  $C_{1-6}$  alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or alternatively  $R^{24}$  and  $R^{25}$  may form a saturated or unsaturated five- to seven-membered heterocyclic ring together with a nitrogen atom to which they are attached (the heterocyclic ring may further contain at least one oxygen, nitrogen, or sulfur atom, may form a bicyclic ring fused with another ring, or may be substituted by  $C_{1-6}$  alkyl); and

(n)  $-NR^{26}R^{27}$  wherein  $R^{26}$  and  $R^{27}$ , which may be the same or different, represent a hydrogen atom or  $-COR^{28}$  wherein  $R^{28}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, or phenyl which may be substituted by  $C_{1-6}$  alkyl or  $C_{1-6}$  alkoxy optionally substituted by phenyl;

$R^{21}$  and  $R^{22}$ , which may be the same or different, represent a hydrogen atom or  $C_{1-6}$  alkyl which may be substituted by a halogen atom; and

Q represents a group selected from the following groups (i) to (iv) or a halogen atom or C<sub>1-6</sub> alkoxy:



wherein

R<sup>33</sup> represents

C<sub>1-6</sub> alkyl which may be substituted by C<sub>1-6</sub> alkoxy optionally substituted by C<sub>1-6</sub> alkoxy, phenyl optionally substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or a saturated or unsaturated five- to seven-membered heterocyclic ring optionally substituted by C<sub>1-6</sub> alkoxy, amino, or nitro,

phenyl which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or

a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or

R<sup>33</sup> may form C<sub>1-4</sub> alkylene together with R<sup>31</sup> or R<sup>32</sup>,

R<sup>34</sup> represents

C<sub>1-16</sub> alkyl which may be substituted by a halogen atom, carboxyl, phenyl optionally substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or a saturated or unsaturated five- to seven-membered heterocyclic ring optionally substituted by C<sub>1-6</sub> alkoxy, amino, or nitro,

phenyl which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or

a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro,

R<sup>35</sup> and R<sup>36</sup>, which may be the same or different, represent a hydrogen atom or C<sub>1-6</sub> alkyl which may be

substituted by amino optionally substituted by C<sub>1-11</sub> alkyl or

R<sup>15</sup> and R<sup>16</sup> may form a saturated or unsaturated five- to seven-membered heterocyclic ring together with a nitrogen atom to which they are attached, and

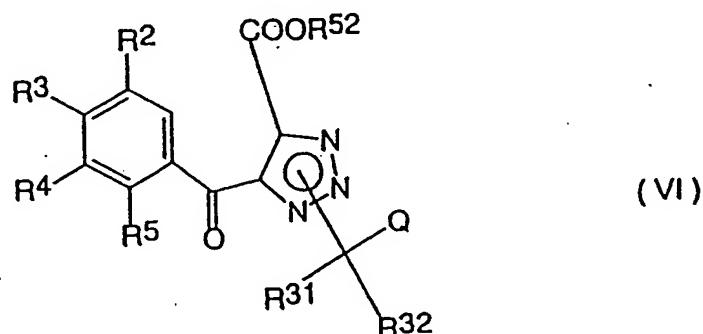
R<sup>17</sup> and R<sup>18</sup>, which may be the same or different, represent C<sub>1-6</sub> alkyl,

R<sup>51</sup> represents nitro or amino, and

R<sup>52</sup> represents a hydrogen atom or a protective group for carboxyl selected from the group consisting of methyl, ethyl, tert-butyl, benzyl, 4-methoxybenzyl, diphenylmethyl, 4-nitrobenzyl, tert-butyltrimethylsilyl, triphenylsilyl, 2-phenylsulfonyl, 2-methoxycarbonyl, 2-cyanoethyl, and 2-trimethylsilyl,

provided that the group -CR<sup>31</sup>R<sup>32</sup>Q does not represent C<sub>1-6</sub> alkyl substituted by a halogen atom or C<sub>1-6</sub> alkoxy.

33. (Withdrawn) A compound represented by formula (VI) or a salt or solvate thereof:



wherein R<sup>1</sup>, R<sup>3</sup>, R<sup>4</sup>, and R<sup>5</sup>, which may be the same or different, represent any one of the following (a) to (n):

- (a) a hydrogen atom;
- (b) a halogen atom;
- (c) an optionally protected hydroxyl group;
- (d) formyl;
- (e) C<sub>1-11</sub> alkyl which may be substituted by a halogen atom;

(f)  $C_{2-12}$  alkenyl which has one or more carbon-carbon double bonds and may be substituted by

- (1) a halogen atom,
- (2) cyano,
- (3)  $-COR'$  wherein  $R'$  represents a hydrogen atom or  $C_{1-6}$  alkyl,
- (4)  $-COOR^{10}$  wherein  $R^{10}$  represents a hydrogen atom or  $C_{1-6}$  alkyl,
- (5)  $-CONR^{11}R^{12}$  wherein  $R^{11}$  and  $R^{12}$ , which may be the same or different, represent

(i) a hydrogen atom,

(ii)  $C_{1-6}$  alkyl which may be substituted by amino optionally substituted by  $C_{1-6}$  alkyl, phenyl optionally substituted by  $C_{1-6}$  alkyl which may be substituted by a saturated five- to seven-membered heterocyclic ring containing one or two nitrogen atoms (the nitrogen atoms may be substituted by  $C_{1-6}$  alkyl), or a saturated or unsaturated five- to seven-membered heterocyclic ring,

(iii) phenyl which may be substituted by carboxyl, or

(iv) a saturated or unsaturated five to seven-membered heterocyclic ring,

(6) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by  $C_{1-6}$  alkyl or may form a bicyclic ring fused with another ring;

(g)  $C_{1-12}$  alkoxy which may be substituted by

- (1) a halogen atom,
- (2) a hydroxyl group,
- (3) cyano,

- (4)  $C_{1-7}$  cycloalkyl,
- (5) phenyl,
- (6)  $C_{1-6}$  alkoxy,
- (7) phenoxy,
- (8) amino which may be substituted by  $C_{1-4}$  alkyl,
- (9)  $-COR^{13}$  wherein  $R^{13}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, phenyl optionally substituted by halogen or  $C_{1-4}$  alkoxy, or phenyl  $C_{1-4}$  alkyl,
- (10)  $-COOR^{14}$  wherein  $R^{14}$  represents a hydrogen atom or  $C_{1-6}$  alkyl,
- (11)  $-CONR^{15}R^{16}$  wherein  $R^{15}$  and  $R^{16}$ , which may be the same or different, represent a hydrogen atom or  $C_{1-6}$  alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or
- (12) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by  $C_{1-4}$  alkyl or phenyl  $C_{1-4}$  alkyl;

(h)  $-C=N-OR^{16a}$  wherein  $R^{16a}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, phenyl  $C_{1-4}$  alkyl, or phenyl;

(i)  $-(CH_2)^mOR^{17}$  wherein  $m$  is an integer of 0 to 4, and  $R^{17}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, or phenyl  $C_{1-4}$  alkyl of which one or more hydrogen atoms on the benzene ring may be substituted by  $C_{1-4}$  alkyl;

(j)  $-(CH_2)^k-COR^{18}$  wherein  $k$  is an integer of 1 to 4, and  $R^{18}$  represents a hydrogen atom or  $C_{1-4}$  alkyl;

(k)  $-(CH_2)^j-COOR^{19}$  wherein  $j$  is an integer of 0 to 4, and  $R^{19}$  represents a hydrogen atom or  $C_{1-6}$  alkyl;

(l)  $-(CH_2)^p-NR^{20}R^{21}$  wherein  $p$  is an integer of 1 to 4, and  $R^{20}$  and  $R^{21}$ , which may be the same or different, represent

(1) a hydrogen atom,

(2)  $C_{1-6}$  alkyl which may be substituted by amino optionally substituted by  $C_{1-4}$  alkyl,

(3) phenyl  $C_{1-4}$  alkyl,

(4)  $-COR^{22}$  wherein  $R^{22}$  represents a hydrogen atom or  $C_{1-4}$  alkyl which may be substituted by carboxyl, or

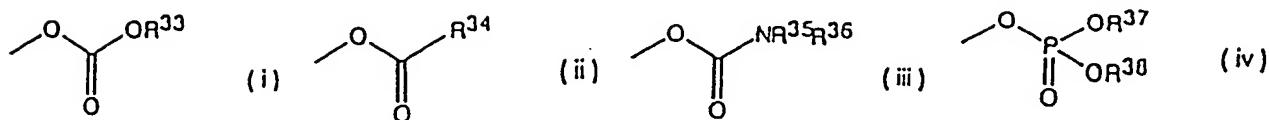
(5)  $-SO_2R^{23}$  wherein  $R^{23}$  represents  $C_{1-4}$  alkyl or phenyl which may be substituted by a halogen atom;

(m)  $-(CH_2)^qCONR^{24}R^{25}$  wherein  $q$  is an integer of 0 to 4, and  $R^{24}$  and  $R^{25}$ , which may be the same or different, represent a hydrogen atom, a saturated or unsaturated five- to seven-membered heterocyclic ring, or  $C_{1-6}$  alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or alternatively  $R^{24}$  and  $R^{25}$  may form a saturated or unsaturated five- to seven-membered heterocyclic ring together with a nitrogen atom to which they are attached (the heterocyclic ring may further contain at least one oxygen, nitrogen, or sulfur atom, may form a bicyclic ring fused with another ring, or may be substituted by  $C_{1-4}$  alkyl); and

(n)  $-NR^{26}R^{27}$  wherein  $R^{26}$  and  $R^{27}$ , which may be the same or different, represent a hydrogen atom or  $-COR^{28}$  wherein  $R^{28}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, or phenyl which may be substituted by  $C_{1-4}$  alkyl or  $C_{1-6}$  alkoxy optionally substituted by phenyl;

$R^{11}$  and  $R^{12}$ , which may be the same or different, represent a hydrogen atom or  $C_{1-6}$  alkyl which may be substituted by a halogen atom; and

Q represents a group selected from the following groups (i) to (iv) or a halogen atom or  $C_{1-6}$  alkoxy:



wherein

R<sup>11</sup> represents

$C_{1-6}$  alkyl which may be substituted by  $C_{1-6}$  alkoxy optionally substituted by  $C_{1-6}$  alkoxy, phenyl optionally substituted by  $C_{1-6}$  alkoxy, amino, or nitro, or a saturated or unsaturated five- to seven-membered heterocyclic ring optionally substituted by  $C_{1-6}$  alkoxy, amino, or nitro,

phenyl which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or

a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by C<sub>1-6</sub>, alkoxy, amino, or nitro, or

$R^{33}$  may form  $C_{1-4}$  alkylene together with  $R^{31}$  or  $R^{32}$ ,

$R^3$  represents

·  $C_{1-16}$  alkyl which may be substituted by a halogen atom, carboxyl, phenyl optionally substituted by  $C_{1-6}$  alkoxy, amino, or nitro, or a saturated or unsaturated five- to seven-membered heterocyclic ring optionally substituted by  $C_{1-6}$  alkoxy, amino, or nitro,

phenyl which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or

a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro,

$R^{15}$  and  $R^{16}$ , which may be the same or different, represent a hydrogen atom or  $C_{1-6}$  alkyl which may be

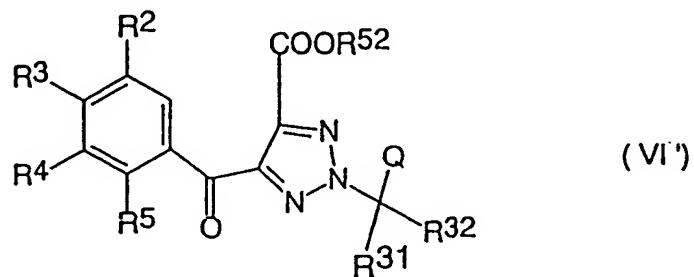
substituted by amino optionally substituted by  $C_{1-4}$  alkyl or

$R^{15}$  and  $R^{16}$  may form a saturated or unsaturated five- to seven-membered heterocyclic ring together with a nitrogen atom to which they are attached, and

$R^{17}$  and  $R^{18}$ , which may be the same or different, represent  $C_{1-6}$  alkyl,

$R^{52}$  represents a hydrogen atom or a protective group for carboxyl, provided that the group  $-CR^{31}R^{32}Q$  does not represent  $C_{1-6}$  alkyl substituted by a halogen atom or  $C_{1-6}$  alkoxy.

34. (Withdrawn) A compound represented by formula (VI') or a salt or solvate thereof:



wherein  $R^2$ ,  $R^3$ ,  $R^4$ , and  $R^5$ , which may be the same or different, represent any one of the following (a) to (n):

- (a) a hydrogen atom;
- (b) a halogen atom;
- (c) an optionally protected hydroxyl group;
- (d) formyl;
- (e)  $C_{1-12}$  alkyl which may be substituted by a halogen atom;

(f)  $C_{2-11}$  alkenyl which has one or more carbon-carbon double bonds and may be substituted by

- (1) a halogen atom,
- (2) cyano,
- (3)  $-COR^9$  wherein  $R^9$  represents a hydrogen atom or  $C_{1-6}$  alkyl,
- (4)  $-COOR^{10}$  wherein  $R^{10}$  represents a hydrogen atom or  $C_{1-6}$  alkyl,
- (5)  $-CONR^{11}R^{12}$  wherein  $R^{11}$  and  $R^{12}$ , which may be the same or different, represent
  - (i) a hydrogen atom,
  - (ii)  $C_{1-6}$  alkyl which may be substituted by amino optionally substituted by  $C_{1-4}$  alkyl, phenyl optionally substituted by  $C_{1-4}$  alkyl which may be substituted by a saturated five- to seven-membered heterocyclic ring containing one or two nitrogen atoms (the nitrogen atoms may be substituted by  $C_{1-4}$  alkyl), or a saturated or unsaturated five- to seven-membered heterocyclic ring,
  - (iii) phenyl which may be substituted by carboxyl, or
  - (iv) a saturated or unsaturated five to seven-membered heterocyclic ring,
- (6) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by  $C_{1-4}$  alkyl or may form a bicyclic ring fused with another ring;
- (g)  $C_{1-11}$  alkoxy which may be substituted by
  - (1) a halogen atom,
  - (2) a hydroxyl group,
  - (3) cyano,

- (4)  $C_{1-4}$  cycloalkyl,
- (5) phenyl,
- (6)  $C_{1-4}$  alkoxy,
- (7) phenoxy,
- (8) amino which may be substituted by  $C_{1-4}$  alkyl,
- (9)  $-COR^{11}$  wherein  $R^{11}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, phenyl optionally substituted by halogen or  $C_{1-4}$  alkoxy, or phenyl  $C_{1-4}$  alkyl,
- (10)  $-COOR^{14}$  wherein  $R^{14}$  represents a hydrogen atom or  $C_{1-6}$  alkyl,
- (11)  $-CONR^{15}R^{16}$  wherein  $R^{15}$  and  $R^{16}$ , which may be the same or different, represent a hydrogen atom or  $C_{1-6}$  alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or
- (12) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by  $C_{1-4}$  alkyl or phenyl  $C_{1-4}$  alkyl;

(h)  $-C=N-OR^{16a}$  wherein  $R^{16a}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, phenyl  $C_{1-4}$  alkyl, or phenyl;

(i)  $-(CH_2)^mOR^{17}$  wherein  $m$  is an integer of 0 to 4, and  $R^{17}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, or phenyl  $C_{1-4}$  alkyl of which one or more hydrogen atoms on the benzene ring may be substituted by  $C_{1-4}$  alkyl;

(j)  $-(CH_2)^k-COR^{18}$  wherein  $k$  is an integer of 1 to 4, and  $R^{18}$  represents a hydrogen atom or  $C_{1-4}$  alkyl;

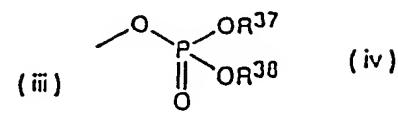
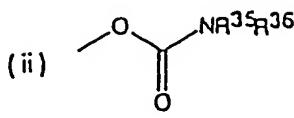
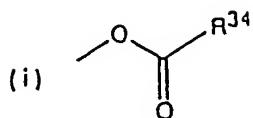
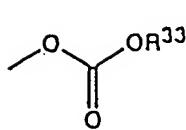
(k)  $-(CH_2)^j-COOR^{19}$  wherein  $j$  is an integer of 0 to 4, and  $R^{19}$  represents a hydrogen atom or  $C_{1-6}$  alkyl;

(l)  $-(CH_2)^p-NR^{20}R^{21}$  wherein  $p$  is an integer of 1 to 4, and  $R^{20}$  and  $R^{21}$ , which may be the same or different, represent

- (1) a hydrogen atom,
- (2)  $C_{1-6}$  alkyl which may be substituted by amino optionally substituted by  $C_{1-4}$  alkyl,
- (3) phenyl  $C_{1-4}$  alkyl,
- (4)  $-COR^{22}$  wherein  $R^{22}$  represents a hydrogen atom or  $C_{1-4}$  alkyl which may be substituted by carboxyl, or
- (5)  $-SO_2R^{23}$  wherein  $R^{23}$  represents  $C_{1-4}$  alkyl or phenyl which may be substituted by a halogen atom;
- (m)  $-(CH_2)^q-CONR^{24}R^{25}$  wherein  $q$  is an integer of 0 to 4, and  $R^{24}$  and  $R^{25}$ , which may be the same or different, represent a hydrogen atom, a saturated or unsaturated five- to seven-membered heterocyclic ring, or  $C_{1-6}$  alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or alternatively  $R^{24}$  and  $R^{25}$  may form a saturated or unsaturated five- to seven-membered heterocyclic ring together with a nitrogen atom to which they are attached (the heterocyclic ring may further contain at least one oxygen, nitrogen, or sulfur atom, may form a bicyclic ring fused with another ring, or may be substituted by  $C_{1-6}$  alkyl); and
- (n)  $-NR^{26}R^{27}$  wherein  $R^{26}$  and  $R^{27}$ , which may be the same or different, represent a hydrogen atom or  $-COR^{28}$  wherein  $R^{28}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, or phenyl which may be substituted by  $C_{1-4}$  alkyl or  $C_{1-6}$  alkoxy optionally substituted by phenyl;

$R^{21}$  and  $R^{22}$ , which may be the same or different, represent a hydrogen atom or  $C_{1-6}$  alkyl which may be substituted by a halogen atom; and

Q represents a group selected from the following groups (i) to (iv) or a halogen atom or C<sub>1-6</sub> alkoxy:



wherein

R<sup>11</sup> represents

C<sub>1-6</sub> alkyl which may be substituted by C<sub>1-6</sub> alkoxy optionally substituted by C<sub>1-6</sub> alkoxy, phenyl optionally substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or a saturated or unsaturated five- to seven-membered heterocyclic ring optionally substituted by C<sub>1-6</sub> alkoxy, amino, or nitro,

phenyl which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or

a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or

R<sup>11</sup> may form C<sub>1-6</sub> alkylene together with R<sup>11</sup> or R<sup>31</sup>,

R<sup>14</sup> represents

C<sub>1-16</sub> alkyl which may be substituted by a halogen atom, carboxyl, phenyl optionally substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or a saturated or unsaturated five- to seven-membered heterocyclic ring optionally substituted by C<sub>1-6</sub> alkoxy, amino, or nitro,

phenyl which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or

a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro,

R<sup>15</sup> and R<sup>16</sup>, which may be the same or different, represent a hydrogen atom or C<sub>1-6</sub> alkyl which may be

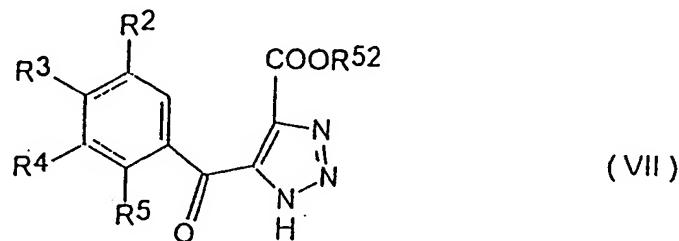
substituted by amino optionally substituted by C<sub>1-4</sub> alkyl or

R<sup>15</sup> and R<sup>16</sup> may form a saturated or unsaturated five- to seven-membered heterocyclic ring together with a nitrogen atom to which they are attached, and

R<sup>17</sup> and R<sup>18</sup>, which may be the same or different, represent C<sub>1-6</sub> alkyl,

R<sup>52</sup> represents a hydrogen atom or a protective group for carboxyl, provided that the group -CR<sup>31</sup>R<sup>32</sup>Q does not represent C<sub>1-6</sub> alkyl substituted by a halogen atom or C<sub>1-6</sub> alkoxy.

35. (Withdrawn) A compound represented by formula (VII) or a salt or solvate thereof:



wherein R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, and R<sup>5</sup>, which may be the same or different, represent any one of the following (a) to (n):

- (a) a hydrogen atom;
- (b) a halogen atom;
- (c) an optionally protected hydroxyl group;
- (d) formyl;
- (e) C<sub>1-12</sub> alkyl which may be substituted by a halogen atom;
- (f) C<sub>2-12</sub> alkenyl which has one or more carbon-carbon double bonds and may be substituted by
  - (1) a halogen atom,

- (2) cyano,
- (3) -COR<sup>9</sup> wherein R<sup>9</sup> represents a hydrogen atom or C<sub>1-6</sub> alkyl,
- (4) -COOR<sup>10</sup> wherein R<sup>10</sup> represents a hydrogen atom or C<sub>1-6</sub> alkyl,
- (5) -CONR<sup>11</sup>R<sup>12</sup> wherein R<sup>11</sup> and R<sup>12</sup>, which may be the same or different, represent
  - (i) a hydrogen atom,
  - (ii) C<sub>1-6</sub> alkyl which may be substituted by amino optionally substituted by C<sub>1-4</sub> alkyl, phenyl optionally substituted by C<sub>1-4</sub> alkyl which may be substituted by a saturated five- to seven-membered heterocyclic ring containing one or two nitrogen atoms (the nitrogen atoms may be substituted by C<sub>1-4</sub> alkyl), or a saturated or unsaturated five- to seven-membered heterocyclic ring,
  - (iii) phenyl which may be substituted by carboxyl, or
  - (iv) a saturated or unsaturated five to seven-membered heterocyclic ring,
- (6) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by C<sub>1-4</sub> alkyl or may form a bicyclic ring fused with another ring;
- (g) C<sub>1-11</sub> alkoxy which may be substituted by
  - (1) a halogen atom,
  - (2) a hydroxyl group,
  - (3) cyano,
  - (4) C<sub>1-7</sub> cycloalkyl,
  - (5) phenyl,

- (6)  $C_{1-4}$  alkoxy,
- (7) phenoxy,
- (8) amino which may be substituted by  $C_{1-4}$  alkyl,
- (9)  $-COR^{13}$  wherein  $R^{13}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, phenyl optionally substituted by halogen or  $C_{1-4}$  alkoxy, or phenyl  $C_{1-4}$  alkyl,
- (10)  $-COOR^{14}$  wherein  $R^{14}$  represents a hydrogen atom or  $C_{1-6}$  alkyl,
- (11)  $-CONR^{15}R^{16}$  wherein  $R^{15}$  and  $R^{16}$ , which may be the same or different, represent a hydrogen atom or  $C_{1-6}$  alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or
- (12) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by  $C_{1-4}$  alkyl or phenyl  $C_{1-4}$  alkyl;

(h)  $-C=N-OR^{16a}$  wherein  $R^{16a}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, phenyl  $C_{1-4}$  alkyl, or phenyl;

(i)  $-(CH_2)^mOR^{17}$  wherein  $m$  is an integer of 0 to 4, and  $R^{17}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, or phenyl  $C_{1-4}$  alkyl of which one or more hydrogen atoms on the benzene ring may be substituted by  $C_{1-4}$  alkyl;

(j)  $-(CH_2)^k-COR^{18}$  wherein  $k$  is an integer of 1 to 4, and  $R^{18}$  represents a hydrogen atom or  $C_{1-4}$  alkyl;

(k)  $-(CH_2)^j-COOR^{19}$  wherein  $j$  is an integer of 0 to 4, and  $R^{19}$  represents a hydrogen atom or  $C_{1-6}$  alkyl;

(l)  $-(CH_2)^p-NR^{20}R^{21}$  wherein  $p$  is an integer of 1 to 4, and  $R^{20}$  and  $R^{21}$ , which may be the same or different, represent

- (1) a hydrogen atom,

(2)  $C_{1-6}$  alkyl which may be substituted by amino optionally substituted by  $C_{1-4}$  alkyl,

(3) phenyl  $C_{1-4}$  alkyl,

(4)  $-COR^{22}$  wherein  $R^{22}$  represents a hydrogen atom or  $C_{1-4}$  alkyl which may be substituted by carboxyl, or

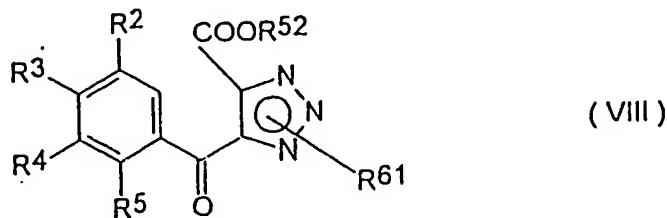
(5)  $-SO_2R^{23}$  wherein  $R^{23}$  represents  $C_{1-4}$  alkyl or phenyl which may be substituted by a halogen atom;

(m)  $-(CH_2)_qCONR^{24}R^{25}$  wherein  $q$  is an integer of 0 to 4, and  $R^{24}$  and  $R^{25}$ , which may be the same or different, represent a hydrogen atom, a saturated or unsaturated five- to seven-membered heterocyclic ring, or  $C_{1-6}$  alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or alternatively  $R^{24}$  and  $R^{25}$  may form a saturated or unsaturated five- to seven-membered heterocyclic ring together with a nitrogen atom to which they are attached (the heterocyclic ring may further contain at least one oxygen, nitrogen, or sulfur atom, may form a bicyclic ring fused with another ring, or may be substituted by  $C_{1-4}$  alkyl); and

(n)  $-NR^{26}R^{27}$  wherein  $R^{26}$  and  $R^{27}$ , which may be the same or different, represent a hydrogen atom or  $-COR^{28}$  wherein  $R^{28}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, or phenyl which may be substituted by  $C_{1-4}$  alkyl or  $C_{1-6}$  alkoxy optionally substituted by phenyl; and

$R^{52}$  represents a hydrogen atom or a protective group for carboxyl.

36. (Withdrawn) A compound represented by formula (VIII) or a salt or solvate thereof:



wherein R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, and R<sup>5</sup>, which may be the same or different, represent any one of the following (a) to (n):

- (a) a hydrogen atom;
- (b) a halogen atom;
- (c) an optionally protected hydroxyl group;
- (d) formyl;
- (e) C<sub>1-12</sub> alkyl which may be substituted by a halogen atom;

(f) C<sub>2-12</sub> alkenyl which has one or more carbon-carbon double bonds and may be substituted by

- (1) a halogen atom,
- (2) cyano,
- (3) -COR<sup>9</sup> wherein R<sup>9</sup> represents a hydrogen atom or C<sub>1-6</sub> alkyl,

(4) -COOR<sup>10</sup> wherein R<sup>10</sup> represents a hydrogen atom or C<sub>1-6</sub> alkyl,

(5) -CONR<sup>11</sup>R<sup>12</sup> wherein R<sup>11</sup> and R<sup>12</sup>, which may be the same or different, represent

- (i) a hydrogen atom,
- (ii) C<sub>1-6</sub> alkyl which may be substituted by amino optionally substituted by C<sub>1-4</sub> alkyl, phenyl optionally substituted by C<sub>1-4</sub> alkyl which may be substituted by a saturated five- to seven-membered heterocyclic ring containing one or two nitrogen atoms (the

nitrogen atoms may be substituted by C<sub>1-4</sub> alkyl), or a saturated or unsaturated five- to seven-membered heterocyclic ring,

(iii) phenyl which may be substituted by carboxyl, or

(iv) a saturated or unsaturated five to seven-membered heterocyclic ring,

(6) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by C<sub>1-4</sub> alkyl or may form a bicyclic ring fused with another ring;

(g) C<sub>1-11</sub> alkoxy which may be substituted by

(1) a halogen atom,

(2) a hydroxyl group,

(3) cyano,

(4) C<sub>1-7</sub> cycloalkyl,

(5) phenyl,

(6) C<sub>1-4</sub> alkoxy,

(7) phenoxy,

(8) amino which may be substituted by C<sub>1-4</sub> alkyl,

(9) -COR<sup>11</sup> wherein R<sup>11</sup> represents a hydrogen atom, C<sub>1-6</sub> alkyl, phenyl optionally substituted by halogen or C<sub>1-4</sub> alkoxy, or phenyl C<sub>1-4</sub> alkyl,

(10) -COOR<sup>14</sup> wherein R<sup>14</sup> represents a hydrogen atom or C<sub>1-6</sub> alkyl,

(11) -CONR<sup>15</sup>R<sup>16</sup> wherein R<sup>15</sup> and R<sup>16</sup>, which may be the same or different, represent a hydrogen atom or C<sub>1-6</sub> alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or

(12) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by  $C_{1-4}$  alkyl or phenyl  $C_{1-4}$  alkyl;

(h)  $-C=N-OR^{16a}$  wherein  $R^{16a}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, phenyl  $C_{1-4}$  alkyl, or phenyl;

(i)  $-(CH_2)^mOR^{17}$  wherein  $m$  is an integer of 0 to 4, and  $R^{17}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, or phenyl  $C_{1-4}$  alkyl of which one or more hydrogen atoms on the benzene ring may be substituted by  $C_{1-4}$  alkyl;

(j)  $-(CH_2)^k-COR^{18}$  wherein  $k$  is an integer of 1 to 4, and  $R^{18}$  represents a hydrogen atom or  $C_{1-4}$  alkyl;

(k)  $-(CH_2)^j-COOR^{19}$  wherein  $j$  is an integer of 0 to 4, and  $R^{19}$  represents a hydrogen atom or  $C_{1-6}$  alkyl;

(l)  $-(CH_2)^p-NR^{20}R^{21}$  wherein  $p$  is an integer of 1 to 4, and  $R^{20}$  and  $R^{21}$ , which may be the same or different, represent

(1) a hydrogen atom,

(2)  $C_{1-6}$  alkyl which may be substituted by amino optionally substituted by  $C_{1-4}$  alkyl,

(3) phenyl  $C_{1-4}$  alkyl,

(4)  $-COR^{22}$  wherein  $R^{22}$  represents a hydrogen atom or  $C_{1-4}$  alkyl which may be substituted by carboxyl, or

(5)  $-SO_2R^{23}$  wherein  $R^{23}$  represents  $C_{1-4}$  alkyl or phenyl which may be substituted by a halogen atom;

(m)  $-(CH_2)^q-CONR^{24}R^{25}$  wherein  $q$  is an integer of 0 to 4, and  $R^{24}$  and  $R^{25}$ , which may be the same or different, represent a hydrogen atom, a saturated or unsaturated

five- to seven-membered heterocyclic ring, or  $C_{1-6}$  alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or alternatively  $R^{74}$  and  $R^{75}$  may form a saturated or unsaturated five- to seven-membered heterocyclic ring together with a nitrogen atom to which they are attached (the heterocyclic ring may further contain at least one oxygen, nitrogen, or sulfur atom, may form a bicyclic ring fused with another ring, or may be substituted by  $C_{1-4}$  alkyl); and

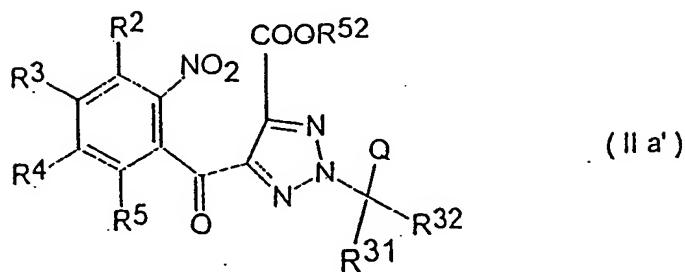
(n)  $-NR^{76}R^{77}$  wherein  $R^{76}$  and  $R^{77}$ , which may be the same or different, represent a hydrogen atom or  $-COR^{78}$  wherein  $R^{78}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, or phenyl which may be substituted by  $C_{1-4}$  alkyl or  $C_{1-6}$  alkoxy optionally substituted by phenyl;

$R^{52}$  represents a hydrogen atom or a protective group for carboxyl; and

$R^{61}$  represents a protective group for triazole.

**Claim 37 (New)**

A process for preparing a compound represented by formula (IIa')



wherein

$\text{R}^2$ ,  $\text{R}^3$ ,  $\text{R}^4$ , and  $\text{R}^5$ , which may be the same or different, represent any one of the following (a) to (n):

- (a) hydrogen atom;
- (b) halogen atom;
- (c) a hydroxyl group optionally protected by acetyl, chloroacetyl, dichloroacetyl, trichloroacetyl, benzoyl, 4-nitrobenzoyl, 3-oxobutyryl, benzyl, diphenylmethyl, triphenylmethyl, 4-methoxybenzyl, 3,4-dimethoxybenzyl, methoxymethyl, methoxyethoxymethyl, benzyloxymethyl, trimethylsilyl, tert-butyldimethylsilyl, triphenylsilyl, 2-tetrahydropyranyl, or trimethylsilylethoxymethoxy;
- (d) formyl;
- (e)  $\text{C}_{1-12}$  alkyl which may be substituted by a halogen atom;
- (f)  $\text{C}_{2-12}$  alkenyl which has one or more carbon-carbon double bonds and may be substituted by
  - (1) a halogen atom,
  - (2) cyano,
  - (3)  $-\text{COR}^9$  wherein  $\text{R}^9$  represents a hydrogen atom or  $\text{C}_{1-6}$  alkyl,
  - (4)  $-\text{COOR}^{10}$  wherein  $\text{R}^{10}$  represents a hydrogen atom or  $\text{C}_{1-6}$  alkyl,
  - (5)  $-\text{CONR}^{11}\text{R}^{12}$  wherein  $\text{R}^{11}$  and  $\text{R}^{12}$ , which may be the same or different, represent
    - (i) a hydrogen atom,

(ii)  $C_{1-6}$  alkyl which may be substituted by amino optionally substituted by  $C_{1-4}$  alkyl, phenyl optionally substituted by  $C_{1-4}$  alkyl which may be substituted by a saturated five- to seven-membered heterocyclic ring containing one or two nitrogen atoms (the nitrogen atoms may be substituted by  $C_{1-4}$  alkyl), or a saturated or unsaturated five- to seven-membered heterocyclic ring,

(iii) phenyl which may be substituted by carboxyl, or

(iv) a saturated or unsaturated five to seven-membered heterocyclic ring,

(6) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by  $C_{1-4}$  alkyl or may form a bicyclic ring fused with another ring;

(g)  $C_{1-12}$  alkoxy which may be substituted by

- (1) a halogen atom,
- (2) a hydroxyl group,
- (3) cyano,
- (4)  $C_{3-7}$  cycloalkyl,
- (5) phenyl,
- (6)  $C_{1-4}$  alkoxy,
- (7) phenoxy,
- (8) amino which may be substituted by  $C_{1-4}$  alkyl,
- (9)  $-COR^{13}$  wherein  $R^{13}$  represents a hydrogen atom,  $C_{1-6}$  alkyl, phenyl optionally substituted by halogen or  $C_{1-4}$  alkoxy, or phenyl  $C_{1-4}$  alkyl,
- (10)  $-COOR^{14}$  wherein  $R^{14}$  represents a hydrogen atom or  $C_{1-6}$  alkyl,
- (11)  $-CONR^{15}R^{16}$  wherein  $R^{15}$  and  $R^{16}$ , which may be the same or different, represent a hydrogen atom or  $C_{1-6}$  alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or

(12) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by C<sub>1-4</sub> alkyl or phenyl C<sub>1-4</sub> alkyl;

(h) -C=N-OR<sup>16</sup> wherein R<sup>16</sup> represents a hydrogen atom, C<sub>1-6</sub> alkyl, phenyl C<sub>1-4</sub> alkyl, or phenyl;

(i) -(CH<sub>2</sub>)<sub>m</sub>OR<sup>17</sup> wherein m is an integer of 0 to 4, and R<sup>17</sup> represents a hydrogen atom, C<sub>1-6</sub> alkyl, or phenyl C<sub>1-4</sub> alkyl of which one or more hydrogen atoms on the benzene ring may be substituted by C<sub>1-4</sub> alkyl;

(j) -(CH<sub>2</sub>)<sub>k</sub>-COR<sup>18</sup> wherein k is an integer of 1 to 4, and R<sup>18</sup> represents a hydrogen atom or C<sub>1-4</sub> alkyl;

(k) -(CH<sub>2</sub>)<sub>j</sub>-COOR<sup>19</sup> wherein j is an integer of 0 to 4, and R<sup>19</sup> represents a hydrogen atom or C<sub>1-6</sub> alkyl;

(l) -(CH<sub>2</sub>)<sub>p</sub>-NR<sup>20</sup>R<sup>21</sup> wherein p is an integer of 1 to 4, and R<sup>20</sup> and R<sup>21</sup>, which may be the same or different, represent

- (1) a hydrogen atom,
- (2) C<sub>1-6</sub> alkyl which may be substituted by amino optionally substituted by C<sub>1-4</sub> alkyl,
- (3) phenyl C<sub>1-4</sub> alkyl,
- (4) -COR<sup>22</sup> wherein R<sup>22</sup> represents a hydrogen atom or C<sub>1-4</sub> alkyl which may be substituted by carboxyl, or

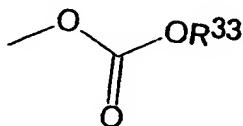
(5) -SO<sub>2</sub>R<sup>23</sup> wherein R<sup>23</sup> represents C<sub>1-4</sub> alkyl or phenyl which may be substituted by a halogen atom;

(m) -(CH<sub>2</sub>)<sub>q</sub>-CONR<sup>24</sup>R<sup>25</sup> wherein q is an integer of 0 to 4, and R<sup>24</sup> and R<sup>25</sup>, which may be the same or different, represent a hydrogen atom, a saturated or unsaturated five- to seven-membered heterocyclic ring, or C<sub>1-6</sub> alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or alternatively R<sup>24</sup> and R<sup>25</sup> may form a saturated or unsaturated five- to seven-membered heterocyclic ring together with a nitrogen atom to which they are attached (the heterocyclic ring may further contain at least one oxygen, nitrogen, or sulfur atom, may form a bicyclic ring fused with another ring, or may be substituted by C<sub>1-4</sub> alkyl); and

(n)  $-\text{NR}^{26}\text{R}^{27}$  wherein  $\text{R}^{26}$  and  $\text{R}^{27}$ , which may be the same or different, represent a hydrogen atom or  $-\text{COR}^{28}$  wherein  $\text{R}^{28}$  represents a hydrogen atom,  $\text{C}_{1-6}$  alkyl, or phenyl which may be substituted by  $\text{C}_{1-4}$  alkyl or  $\text{C}_{1-6}$  alkoxy optionally substituted by phenyl;  
 $\text{R}^{31}$  and  $\text{R}^{32}$ , which may be the same or different, represent a hydrogen atom or  $\text{C}_{1-6}$  alkyl which may be substituted by a halogen atom;

$\text{R}^{52}$  represents a hydrogen atom or a protective group for carboxyl selected from the group consisting of methyl, ethyl, tert-butyl, benzyl, 4-methoxybenzyl, diphenylmethyl, 4-nitrobenzyl, tert-butyldimethylsilyl, triphenylsilyl, 2-phenylsulfonylethyl, 2-methoxycarbonylethyl, 2-cyanoethyl, and 2-trimethylsilylethyl, and

Q represents



wherein

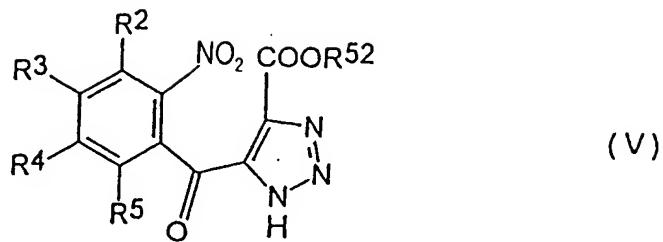
$\text{R}^{33}$  represents

$\text{C}_{1-6}$  alkyl which may be substituted by  $\text{C}_{1-6}$  alkoxy optionally substituted by  $\text{C}_{1-6}$  alkoxy, phenyl optionally substituted by  $\text{C}_{1-6}$  alkoxy, amino, or nitro, or a saturated or unsaturated five- to seven-membered heterocyclic ring optionally substituted by  $\text{C}_{1-6}$  alkoxy, amino, or nitro,

phenyl which may be substituted by  $\text{C}_{1-6}$  alkoxy, amino, or nitro, or a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by  $\text{C}_{1-6}$  alkoxy, amino, or nitro, or

$\text{R}^{33}$  may form  $\text{C}_{1-4}$  alkylene together with  $\text{R}^{31}$  or  $\text{R}^{32}$ , which comprises:

(1) reacting a compound represented by formula (V)



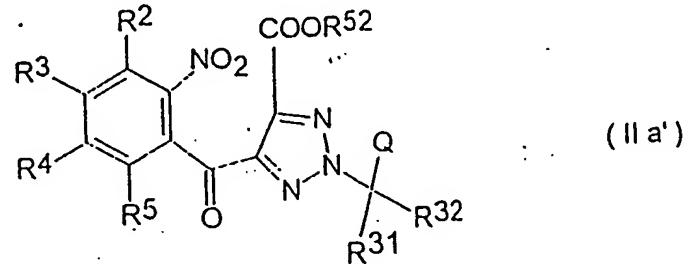
wherein R<sup>2</sup> to R<sup>5</sup> and R<sup>52</sup> are as defined above,

with a compound represented by R<sup>31</sup>R<sup>32</sup>C=O wherein R<sup>31</sup> and R<sup>32</sup> are as defined above;

(2) reacting the compound prepared in (1) with a compound represented by R<sup>71</sup>-C(=O)-R<sup>72</sup> wherein R<sup>71</sup> and R<sup>72</sup> each independently represent a chlorine atom, 4-nitrophenyl, or 1-imidazolyl; and

(3) reacting the compound prepared in (2) with a compound represented by R<sup>33</sup>OH wherein R<sup>33</sup> is as defined above.

**Claim 38 (New)** A process for preparing a compound represented by formula (IIa')



wherein

R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, and R<sup>5</sup>, which may be the same or different, represent any one of the following (a) to (n):

- (a) hydrogen atom;
- (b) halogen atom;
- (c) a hydroxyl group optionally protected by acetyl, chloroacetyl, dichloroacetyl, trichloroacetyl, benzoyl, 4-nitrobenzoyl, 3-oxobutyryl, benzyl, diphenylmethyl, triphenylmethyl, 4-methoxybenzyl, 3,4-dimethoxybenzyl,

methoxymethyl, methoxyethoxymethyl, benzyloxymethyl, trimethylsilyl, tert-butyldimethylsilyl, triphenylsilyl, 2-tetrahydropyranyl, or trimethylsilylethoxymethoxy;

(d) formyl;

(e) C<sub>1-12</sub> alkyl which may be substituted by a halogen atom;

(f) C<sub>2-12</sub> alkenyl which has one or more carbon-carbon double bonds and may be substituted by

(1) a halogen atom,

(2) cyano,

(3) -COR<sup>9</sup> wherein R<sup>9</sup> represents a hydrogen atom or C<sub>1-6</sub> alkyl,

(4) -COOR<sup>10</sup> wherein R<sup>10</sup> represents a hydrogen atom or C<sub>1-6</sub> alkyl,

(5) -CONR<sup>11</sup>R<sup>12</sup> wherein R<sup>11</sup> and R<sup>12</sup>, which may be the same or different, represent

(i) a hydrogen atom,

(ii) C<sub>1-6</sub> alkyl which may be substituted by amino optionally substituted by C<sub>1-4</sub> alkyl, phenyl optionally substituted by C<sub>1-4</sub> alkyl which may be substituted by a saturated five- to seven-membered heterocyclic ring containing one or two nitrogen atoms (the nitrogen atoms may be substituted by C<sub>1-4</sub> alkyl), or a saturated or unsaturated five- to seven-membered heterocyclic ring,

(iii) phenyl which may be substituted by carboxyl, or

(iv) a saturated or unsaturated five to seven-membered heterocyclic ring,

(6) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by C<sub>1-4</sub> alkyl or may form a bicyclic ring fused with another ring;

(g) C<sub>1-12</sub> alkoxy which may be substituted by

(1) a halogen atom,

(2) a hydroxyl group,

- (3) cyano,
- (4) C<sub>3-7</sub> cycloalkyl,
- (5) phenyl,
- (6) C<sub>1-4</sub> alkoxy,
- (7) phenoxy,
- (8) amino which may be substituted by C<sub>1-4</sub> alkyl,
- (9) -COR<sup>13</sup> wherein R<sup>13</sup> represents a hydrogen atom, C<sub>1-6</sub> alkyl, phenyl optionally substituted by halogen or C<sub>1-4</sub> alkoxy, or phenyl C<sub>1-4</sub> alkyl,
- (10) -COOR<sup>14</sup> wherein R<sup>14</sup> represents a hydrogen atom or C<sub>1-6</sub> alkyl,
- (11) -CONR<sup>15</sup>R<sup>16</sup> wherein R<sup>15</sup> and R<sup>16</sup>, which may be the same or different, represent a hydrogen atom or C<sub>1-6</sub> alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or
- (12) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by C<sub>1-4</sub> alkyl or phenyl C<sub>1-4</sub> alkyl;

(h) -C=N-OR<sup>16</sup> wherein R<sup>16</sup> represents a hydrogen atom, C<sub>1-6</sub> alkyl, phenyl C<sub>1-4</sub> alkyl, or phenyl;

(i) -(CH<sub>2</sub>)<sub>m</sub>OR<sup>17</sup> wherein m is an integer of 0 to 4, and R<sup>17</sup> represents a hydrogen atom, C<sub>1-6</sub> alkyl, or phenyl C<sub>1-4</sub> alkyl of which one or more hydrogen atoms on the benzene ring may be substituted by C<sub>1-4</sub> alkyl;

(j) -(CH<sub>2</sub>)<sub>k</sub>-COR<sup>18</sup> wherein k is an integer of 1 to 4, and R<sup>18</sup> represents a hydrogen atom or C<sub>1-4</sub> alkyl;

(k) -(CH<sub>2</sub>)<sub>j</sub>-COOR<sup>19</sup> wherein j is an integer of 0 to 4, and R<sup>19</sup> represents a hydrogen atom or C<sub>1-6</sub> alkyl;

(l) -(CH<sub>2</sub>)<sub>p</sub>-NR<sup>20</sup>R<sup>21</sup> wherein p is an integer of 1 to 4, and R<sup>20</sup> and R<sup>21</sup>, which may be the same or different, represent

- (1) a hydrogen atom,
- (2) C<sub>1-6</sub> alkyl which may be substituted by amino optionally

substituted by C<sub>1-4</sub> alkyl,

(3) phenyl C<sub>1-4</sub> alkyl,

(4) -COR<sup>22</sup> wherein R<sup>22</sup> represents a hydrogen atom or C<sub>1-4</sub> alkyl which may be substituted by carboxyl, or

(5) -SO<sub>2</sub>R<sup>23</sup> wherein R<sup>23</sup> represents C<sub>1-4</sub> alkyl or phenyl which may be substituted by a halogen atom;

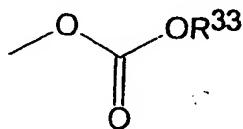
(m) -(CH<sub>2</sub>)<sub>q</sub>-CONR<sup>24</sup>R<sup>25</sup> wherein q is an integer of 0 to 4, and R<sup>24</sup> and R<sup>25</sup>, which may be the same or different, represent a hydrogen atom, a saturated or unsaturated five- to seven-membered heterocyclic ring, or C<sub>1-6</sub> alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or alternatively R<sup>24</sup> and R<sup>25</sup> may form a saturated or unsaturated five- to seven-membered heterocyclic ring together with a nitrogen atom to which they are attached (the heterocyclic ring may further contain at least one oxygen, nitrogen, or sulfur atom, may form a bicyclic ring fused with another ring, or may be substituted by C<sub>1-4</sub> alkyl); and

(n) -NR<sup>26</sup>R<sup>27</sup> wherein R<sup>26</sup> and R<sup>27</sup>, which may be the same or different, represent a hydrogen atom or -COR<sup>28</sup> wherein R<sup>28</sup> represents a hydrogen atom, C<sub>1-6</sub> alkyl, or phenyl which may be substituted by C<sub>1-4</sub> alkyl or C<sub>1-6</sub> alkoxy optionally substituted by phenyl;

R<sup>31</sup> and R<sup>32</sup>, which may be the same or different, represent a hydrogen atom or C<sub>1-6</sub> alkyl which may be substituted by a halogen atom;

R<sup>52</sup> represents a hydrogen atom or a protective group for carboxyl selected from the group consisting of methyl, ethyl, tert-butyl, benzyl, 4-methoxybenzyl, diphenylmethyl, 4-nitrobenzyl, tert-butyldimethylsilyl, triphenylsilyl, 2-phenylsulfonylethyl, 2-methoxycarbonylethyl, 2-cyanoethyl, and 2-trimethylsilylethyl, and

Q represents



wherein

$R^{33}$  represents

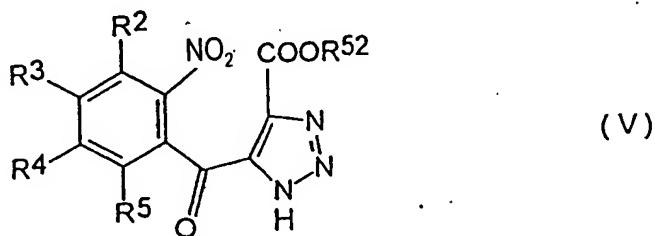
$C_{1-6}$  alkyl which may be substituted by  $C_{1-6}$  alkoxy optionally substituted by  $C_{1-6}$  alkoxy, phenyl optionally substituted by  $C_{1-6}$  alkoxy, amino, or nitro, or a saturated or unsaturated five- to seven-membered heterocyclic ring optionally substituted by  $C_{1-6}$  alkoxy, amino, or nitro,

phenyl which may be substituted by  $C_{1-6}$  alkoxy, amino, or nitro, or a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by  $C_{1-6}$  alkoxy, amino, or nitro, or

$R^{33}$  may form  $C_{1-4}$  alkylene together with  $R^{31}$  or  $R^{32}$ ,

which comprises:

(1) reacting a compound represented by formula (V)

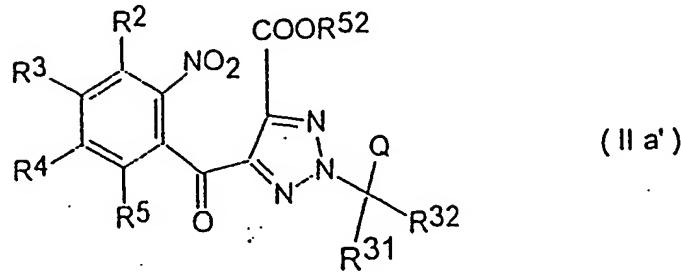


wherein R<sup>2</sup> to R<sup>5</sup> and R<sup>52</sup> are as defined above,

with a compound represented by R<sup>31</sup>R<sup>32</sup>C=O wherein R<sup>31</sup> and R<sup>32</sup> are as defined above; and

(2) reacting the compound prepared in (1) with a compound represented by HalCOOR<sup>33</sup> wherein Hal represents a halogen atom and R<sup>33</sup> is as defined above, in the presence of an alkali metal carbonate and an alkali metal iodide.

**Claim 39 (New)** A process for preparing a compound represented by formula (IIa')



wherein

R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, and R<sup>5</sup>, which may be the same or different, represent any one of the following (a) to (n):

- (a) hydrogen atom;
- (b) halogen atom;
- (c) a hydroxyl group optionally protected by acetyl, chloroacetyl, dichloroacetyl, trichloroacetyl, benzoyl, 4-nitrobenzoyl, 3-oxobutyryl, benzyl, diphenylmethyl, triphenylmethyl, 4-methoxybenzyl, 3,4-dimethoxybenzyl, methoxymethyl, methoxyethoxymethyl, benzyloxymethyl, trimethylsilyl, tert-butyldimethylsilyl, triphenylsilyl, 2-tetrahydropyranyl, or trimethylsilylethoxymethoxy;
- (d) formyl;
- (e) C<sub>1-12</sub> alkyl which may be substituted by a halogen atom;
- (f) C<sub>2-12</sub> alkenyl which has one or more carbon-carbon double bonds and may be substituted by
  - (1) a halogen atom,
  - (2) cyano,
  - (3) -COR<sup>9</sup> wherein R<sup>9</sup> represents a hydrogen atom or C<sub>1-6</sub> alkyl,
  - (4) -COOR<sup>10</sup> wherein R<sup>10</sup> represents a hydrogen atom or C<sub>1-6</sub> alkyl,
  - (5) -CONR<sup>11</sup>R<sup>12</sup> wherein R<sup>11</sup> and R<sup>12</sup>, which may be the same or different, represent

- (i) a hydrogen atom,
- (ii) C<sub>1-6</sub> alkyl which may be substituted by amino optionally substituted by C<sub>1-4</sub> alkyl, phenyl optionally substituted by C<sub>1-4</sub> alkyl which may be substituted by a saturated five- to seven-membered heterocyclic ring containing one or two nitrogen atoms (the nitrogen atoms may be substituted by C<sub>1-4</sub> alkyl), or a saturated or unsaturated five- to seven-membered heterocyclic ring,
- (iii) phenyl which may be substituted by carboxyl, or
- (iv) a saturated or unsaturated five to seven-membered heterocyclic ring,

(6) a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by C<sub>1-4</sub> alkyl or may form a bicyclic ring fused with another ring;

(g) C<sub>1-12</sub> alkoxy which may be substituted by

- (1) a halogen atom,
- (2) a hydroxyl group,
- (3) cyano,
- (4) C<sub>3-7</sub> cycloalkyl,
- (5) phenyl,
- (6) C<sub>1-4</sub> alkoxy,
- (7) phenoxy,
- (8) amino which may be substituted by C<sub>1-4</sub> alkyl,
- (9) -COR<sup>13</sup> wherein R<sup>13</sup> represents a hydrogen atom, C<sub>1-6</sub> alkyl, phenyl optionally substituted by halogen or C<sub>1-4</sub> alkoxy, or phenyl C<sub>1-4</sub> alkyl,
- (10) -COOR<sup>14</sup> wherein R<sup>14</sup> represents a hydrogen atom or C<sub>1-6</sub> alkyl,
- (11) -CONR<sup>15</sup>R<sup>16</sup> wherein R<sup>15</sup> and R<sup>16</sup>, which may be the same or different, represent a hydrogen atom or C<sub>1-6</sub> alkyl which may be substituted by a saturated or unsaturated five- to seven-membered

heterocyclic ring, or

(12) a saturated or unsaturated five- to seven-membered

heterocyclic ring which may be substituted by C<sub>1-4</sub> alkyl or phenyl C<sub>1-4</sub> alkyl;

(h) -C=N-OR<sup>16</sup> wherein R<sup>16</sup> represents a hydrogen atom, C<sub>1-6</sub> alkyl, phenyl C<sub>1-4</sub> alkyl, or phenyl;

(i) -(CH<sub>2</sub>)<sub>m</sub>OR<sup>17</sup> wherein m is an integer of 0 to 4, and R<sup>17</sup> represents a hydrogen atom, C<sub>1-6</sub> alkyl, or phenyl C<sub>1-4</sub> alkyl of which one or more hydrogen atoms on the benzene ring may be substituted by C<sub>1-4</sub> alkyl;

(j) -(CH<sub>2</sub>)<sub>k</sub>-COR<sup>18</sup> wherein k is an integer of 1 to 4, and R<sup>18</sup> represents a hydrogen atom or C<sub>1-4</sub> alkyl;

(k) -(CH<sub>2</sub>)<sub>j</sub>-COOR<sup>19</sup> wherein j is an integer of 0 to 4, and R<sup>19</sup> represents a hydrogen atom or C<sub>1-6</sub> alkyl;

(l) -(CH<sub>2</sub>)<sub>p</sub>-NR<sup>20</sup>R<sup>21</sup> wherein p is an integer of 1 to 4, and R<sup>20</sup> and R<sup>21</sup>, which may be the same or different, represent

(1) a hydrogen atom,

(2) C<sub>1-6</sub> alkyl which may be substituted by amino optionally substituted by C<sub>1-4</sub> alkyl,

(3) phenyl C<sub>1-4</sub> alkyl,

(4) -COR<sup>22</sup> wherein R<sup>22</sup> represents a hydrogen atom or C<sub>1-4</sub> alkyl which may be substituted by carboxyl, or

(5) -SO<sub>2</sub>R<sup>23</sup> wherein R<sup>23</sup> represents C<sub>1-4</sub> alkyl or phenyl which may be substituted by a halogen atom;

(m) -(CH<sub>2</sub>)<sub>q</sub>-CONR<sup>24</sup>R<sup>25</sup> wherein q is an integer of 0 to 4, and R<sup>24</sup> and R<sup>25</sup>, which may be the same or different, represent a hydrogen atom, a saturated or unsaturated five- to seven-membered heterocyclic ring, or C<sub>1-6</sub> alkyl which may be substituted by a saturated or unsaturated five- to seven-membered heterocyclic ring, or alternatively R<sup>24</sup> and R<sup>25</sup> may form a saturated or unsaturated five- to seven-membered heterocyclic ring together with a nitrogen atom to which they are attached (the heterocyclic ring may further contain at least one oxygen, nitrogen, or sulfur atom, may form a bicyclic ring fused with another ring, or may

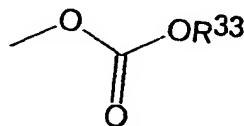
be substituted by C<sub>1-4</sub> alkyl); and

(n) -NR<sup>26</sup>R<sup>27</sup> wherein R<sup>26</sup> and R<sup>27</sup>, which may be the same or different, represent a hydrogen atom or -COR<sup>28</sup> wherein R<sup>28</sup> represents a hydrogen atom, C<sub>1-6</sub> alkyl, or phenyl which may be substituted by C<sub>1-4</sub> alkyl or C<sub>1-6</sub> alkoxy optionally substituted by phenyl;

R<sup>31</sup> and R<sup>32</sup>, which may be the same or different, represent a hydrogen atom or C<sub>1-6</sub> alkyl which may be substituted by a halogen atom;

R<sup>52</sup> represents a hydrogen atom or a protective group for carboxyl selected from the group consisting of methyl, ethyl, tert-butyl, benzyl, 4-methoxybenzyl, diphenylmethyl, 4-nitrobenzyl, tert-butyldimethylsilyl, triphenylsilyl, 2-phenylsulfonylethyl, 2-methoxycarbonylethyl, 2-cyanoethyl, and 2-trimethylsilylethyl, and

Q represents



wherein

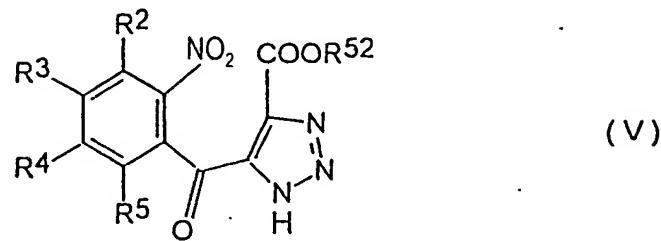
R<sup>33</sup> represents

C<sub>1-6</sub> alkyl which may be substituted by C<sub>1-6</sub> alkoxy optionally substituted by C<sub>1-6</sub> alkoxy, phenyl optionally substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or a saturated or unsaturated five- to seven-membered heterocyclic ring optionally substituted by C<sub>1-6</sub> alkoxy, amino, or nitro,

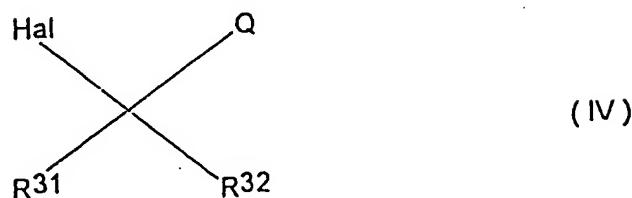
phenyl which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or a saturated or unsaturated five- to seven-membered heterocyclic ring which may be substituted by C<sub>1-6</sub> alkoxy, amino, or nitro, or

R<sup>33</sup> may form C<sub>1-4</sub> alkylene together with R<sup>31</sup> or R<sup>32</sup>, which comprises:

reacting a compound represented by formula (V)



wherein R<sup>2</sup> to R<sup>5</sup> and R<sup>52</sup> are as defined above,  
with a compound represented by formula (IV)



wherein Hal represents a halogen atom, and Q, R<sup>31</sup> and R<sup>32</sup> are as defined above, in the presence of an inorganic base and an alkali metal iodide.